



## Logging Report Prepared for: Invelo Legacy Group

### **Results from metering equipment installed at:**

- 1) The DB Board away from the inverter
- 2) The termination box close to the inverter.

**Metering Point:** The recorder was installed at the 60 Amp Breaker at the DB Board for a day and a half, it was then moved to the termination box close to the inverter. This was done to see if there is a significant voltage drop over the cable between the inverter and the DB board.

**Recording period:** 04/06/2021 16H00 to 07/06/2021 12H30

### **Equipment Used:**

QualiTrack 3 Three Phase Quality of Supply & Profile Recorder.

Averaging period: 60 Seconds.

Peak detection set at 40 milliseconds.

### **Recording Methodology**

The recorder used is configured to measure the Line to Neutral voltage for each of the three phases as well as all the load and energy parameters (currents, powers, power factor and frequency)

The following parameters are recorded:

- 1) Average voltage over a 60 second integration period.
- 2) In that 60 second period the lowest and the highest 40 millisecond (2 cycle) value is stored.
- 3) Record dips as well as swells continuously.
- 4) Record up to the 19<sup>th</sup> Voltage harmonic.
- 5) Power parameters

### **Classification of a Dip**

A dip is classified as a sudden reduction of the nominal voltage. The recorder will record and store the dip values as soon as the nominal RMS voltage fall below 10% or more of declared nominal voltage for 10 milliseconds or longer. These values are stored in nonvolatile memory and can be retrieved for graphical display.

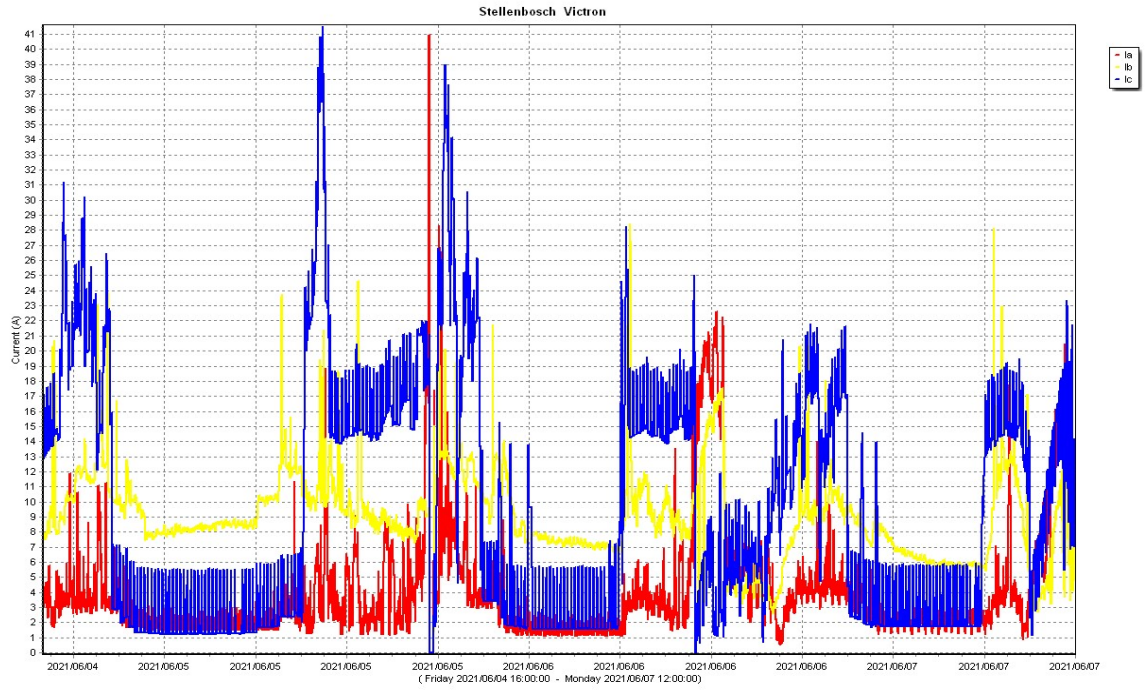
### **Classification of a Swell.**

A swell is measured in the same way as a dip, but is just classified as a sudden increase of RMS voltage with more than 10% of nominal for more than 10 milliseconds.

The following information is included for this point.

- 1) A graph showing the current for the complete recording period.
- 2) A graph showing the voltage over a 1minute averaging interval measured at the DB board away from the Inverter.
- 3) A graph showing the voltage over a 1minute averaging interval with the highest and lowest values calculated over a 2cycle period measured at the DB board away from the Inverter.
- 4) A graph showing the voltage over a 1minute averaging interval measured at termination box at the Inverter
- 5) A graph showing the voltage over a 1minute averaging interval with the highest and lowest values calculated over a 2cycle period measured at the termination box at the Inverter.
- 6) A zoomed graph showing the voltage over a 1minute averaging interval with the highest and lowest values calculated over a 2cycle period
- 7) A Table giving the statistics for the complete recording period.
- 8) A zoomed graph showing the current for time of maximum current demand.
- 9) A zoomed graph showing the summed kVA for time of maximum load demand.
- 10) A graph of the frequency over the complete recording period.
- 11) Dip info
- 12) Swell info.

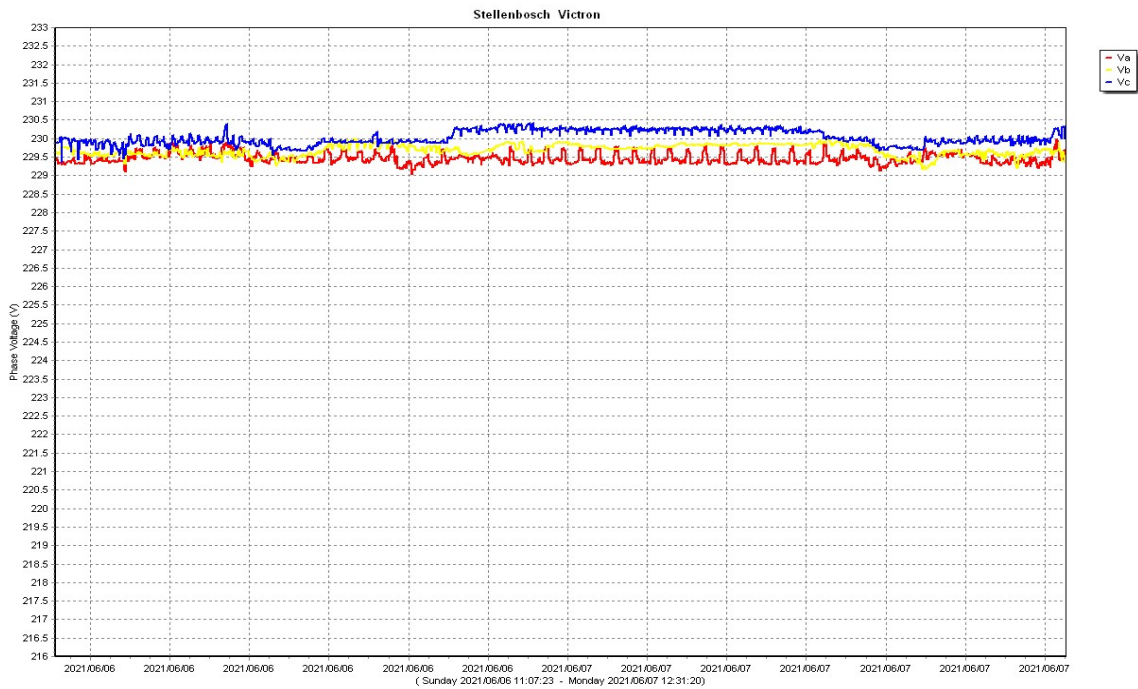
# Main



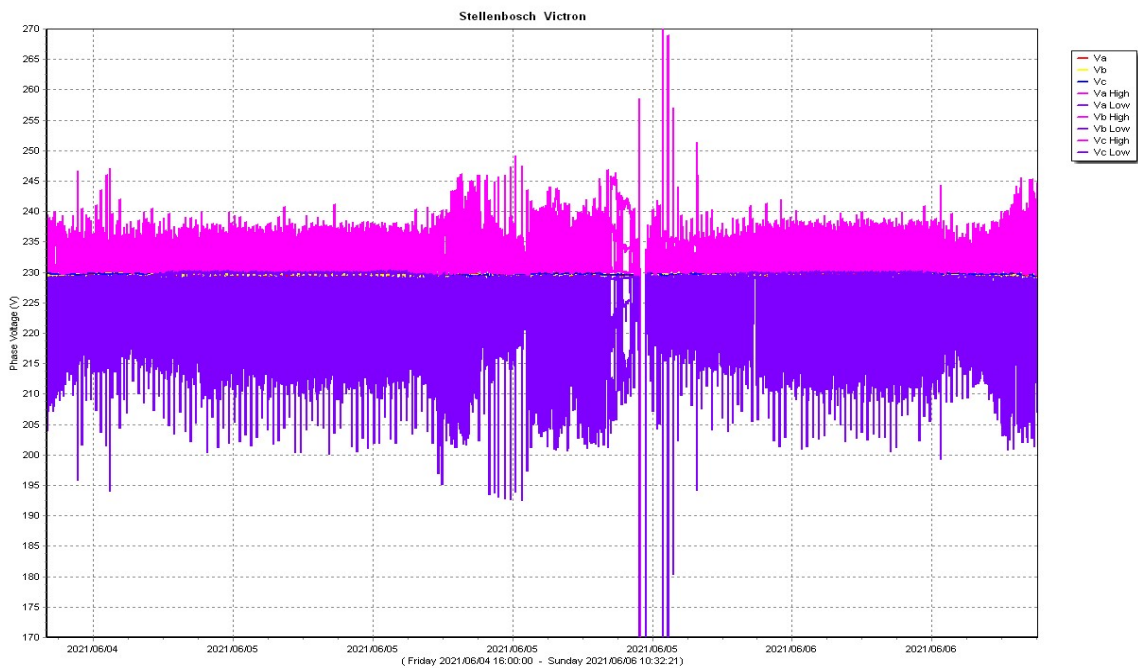
Graph showing the current profile for complete recording period



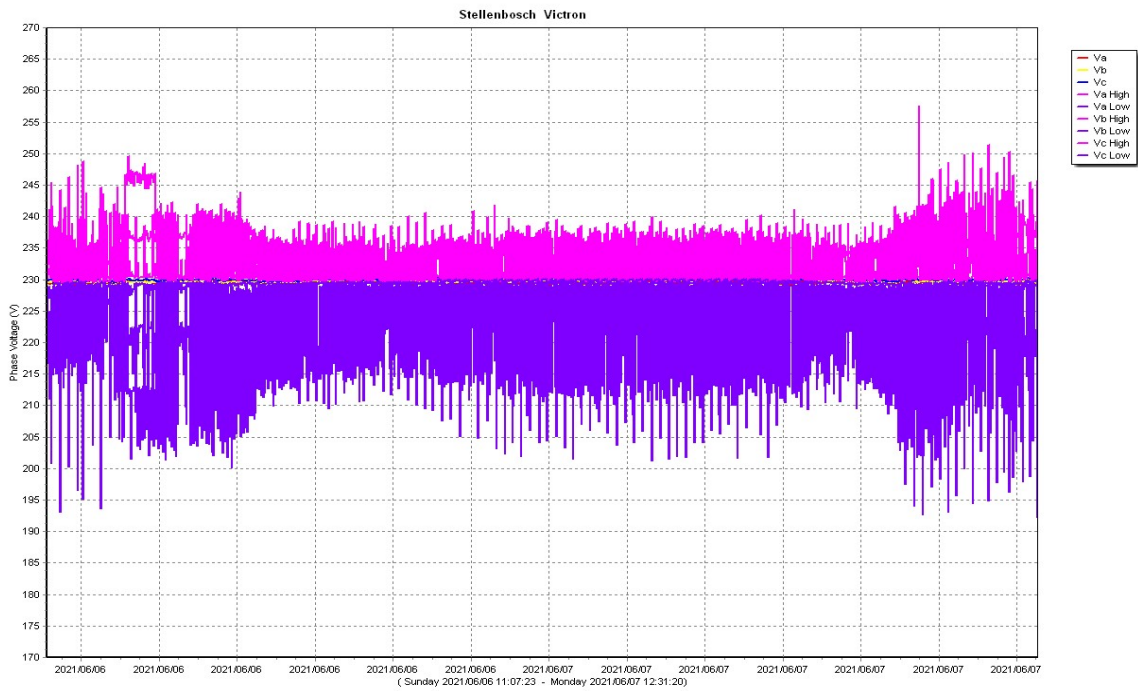
Graph Showing the Voltage profiles with a 1minute average measured at the DB Board away from the inverter



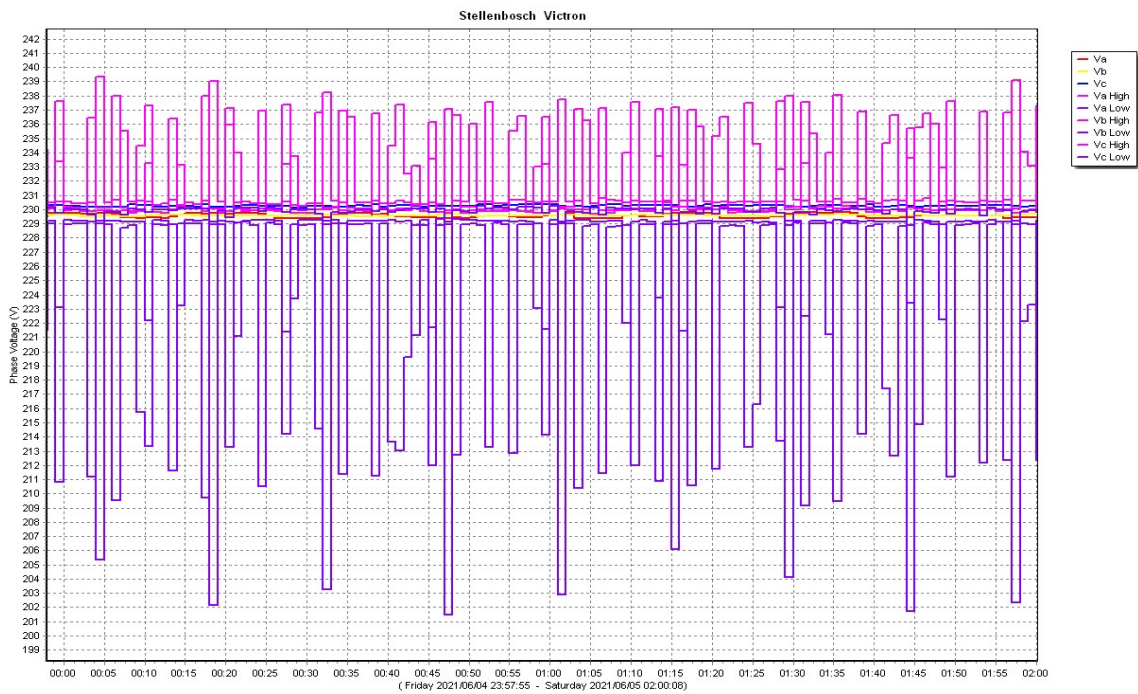
**Graph Showing the Voltage profiles with a 1minute average measured at the termination box at the inverter**



**Graph Showing the Voltage profiles with a 2 cycle Peaks and Dips at the DB board away from the inverter**



**Graph Showing the Voltage profiles with a 2 cycle Peaks and Dips at the termination box at the inverter**



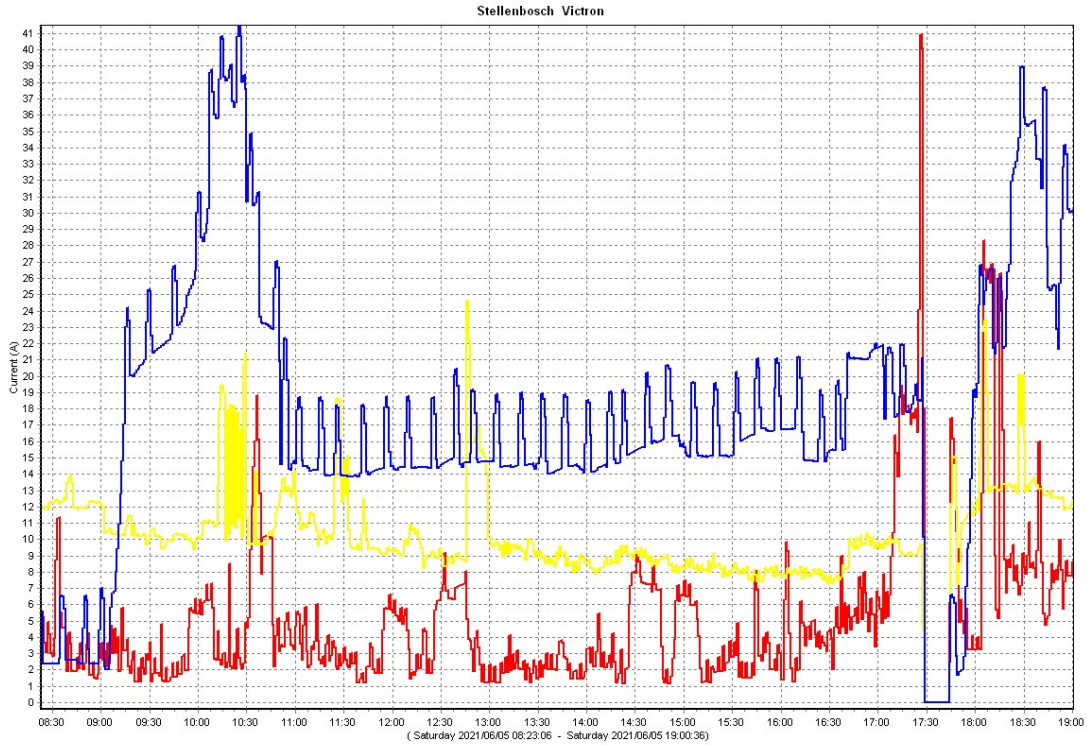
**Zoomed Graph Showing the Voltage profiles with a 2 cycle Peaks and Dips**  
 ( Please note that the Pink traces is the highest 2 cycle values and the purple trace is the lowest 2 cycle values recorded)

### Statistics for complete recording period

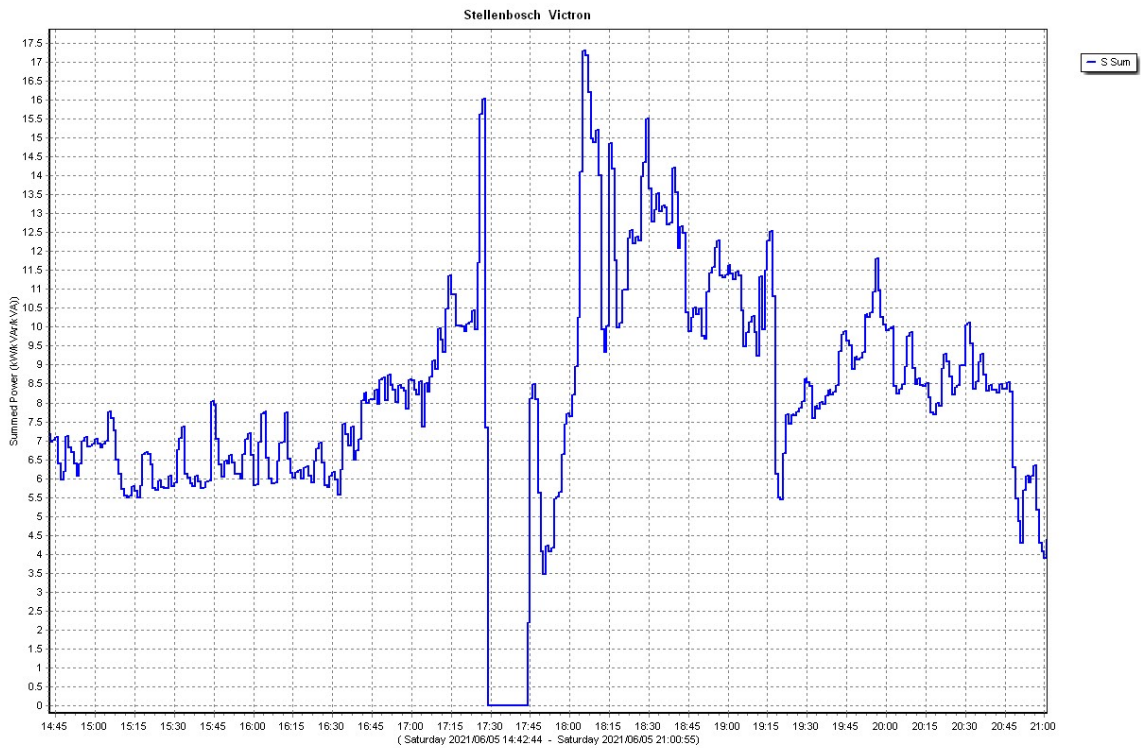
| Information                  | Parameter                  | Date & Time               | Value               | Unit  |
|------------------------------|----------------------------|---------------------------|---------------------|-------|
| Description                  | Stellenbosch               |                           |                     |       |
| Feeder                       | Victron                    |                           |                     |       |
| Graph Statistics             | Recording Start            | 2021/06/04 16:00:00       |                     |       |
|                              | Recording End              | 2021/06/07 12:00:00       |                     |       |
|                              | Recording Period           | 2 Days 20 Hours 0 Minutes |                     |       |
|                              | Averaging Interval         | 1 Minute                  |                     |       |
| Phase Voltage                | Phase A Maximum Va         | 2021/06/05 14:49:00       | 230.0               | V     |
|                              | Phase B Maximum Vb         | 2021/06/07 06:35:00       | 230.0               | V     |
|                              | Phase C Maximum Vc         | 2021/06/05 06:14:00       | 230.6               | V     |
|                              | Phase A Maximum Instant Va | 2021/06/05 17:28:00       | 258.5               | V     |
|                              | Phase B Maximum Instant Vb | 2021/06/05 10:36:00       | 246.0               | V     |
|                              | Phase C Maximum Instant Vc | 2021/06/05 18:28:00       | 270.3               | V     |
|                              | Phase A Minimum Instant Va | 2021/06/06 11:03:00       | 0.000               | V     |
|                              | Phase B Minimum Instant Vb | 2021/06/06 11:03:00       | 0.000               | V     |
|                              | Phase C Minimum Instant Vc | 2021/06/06 11:03:00       | 0.000               | V     |
|                              | Va Average                 |                           | 229.5               | V     |
|                              | Vb Average                 |                           | 229.6               | V     |
|                              | Vc Average                 |                           | 230.0               | V     |
|                              | Line Voltage               | Phase AB Maximum Vab      | 2021/06/05 10:29:00 | 404.5 |
| Phase BC Maximum Vbc         |                            | 2021/06/06 12:40:00       | 400.8               | V     |
| Phase CA Maximum Vca         |                            | 2021/06/04 20:53:00       | 402.3               | V     |
| Phase AB Maximum Instant Vab |                            | 2021/06/05 17:28:00       | 424.4               | V     |
| Phase BC Maximum Instant Vbc |                            | 2021/06/05 18:28:00       | 429.7               | V     |
| Phase CA Maximum Instant Vca |                            | 2021/06/05 18:28:00       | 435.0               | V     |
| Phase AB Minimum Instant Vab |                            | 2021/06/06 11:03:00       | 0.000               | V     |
| Phase BC Minimum Instant Vbc |                            | 2021/06/06 11:03:00       | 0.000               | V     |
| Phase CA Minimum Instant Vca |                            | 2021/06/06 11:03:00       | 0.000               | V     |
| Vab Average                  |                            |                           | 401.1               | V     |
| Vbc Average                  |                            |                           | 395.1               | V     |
| Vca Average                  |                            |                           | 397.0               | V     |
| Current                      |                            | Phase A Maximum Ia        | 2021/06/05 17:27:00 | 40.96 |
|                              | Phase B Maximum Ib         | 2021/06/06 06:42:00       | 28.40               | A     |
|                              | Phase C Maximum Ic         | 2021/06/05 10:26:00       | 41.52               | A     |
|                              | Phase A Maximum Instant Ia | 2021/06/05 17:26:00       | 49.23               | A     |
|                              | Phase B Maximum Instant Ib | 2021/06/06 06:42:00       | 35.91               | A     |
|                              | Phase C Maximum Instant Ic | 2021/06/05 10:25:00       | 64.03               | A     |
|                              | Ia Average                 |                           | 4.116               | A     |
|                              | Ib Average                 |                           | 9.037               | A     |
| Ic Average                   |                            | 9.759                     | A                   |       |

|                    |                              |                     |        |      |
|--------------------|------------------------------|---------------------|--------|------|
| Max Load Unbalance | Nominal Current              | 2021/06/07 11:59:00 | 36.96  | A    |
|                    | Phase A Current              |                     | 40.96  | A    |
|                    | Phase B Current              |                     | 28.40  | A    |
|                    | Phase C Current              |                     | 41.52  | A    |
|                    |                              |                     |        |      |
| Active Power       | Phase A Maximum              | 2021/06/07 07:41:00 | 4.062  | kW   |
|                    | Phase B Maximum              | 2021/06/07 06:39:00 | 6.369  | kW   |
|                    | Phase C Maximum              | 2021/06/06 18:34:00 | 5.011  | kW   |
|                    |                              |                     |        |      |
| Reactive Power     | Phase A Maximum              | 2021/06/06 19:52:00 | 0.400  | kVAr |
|                    | Phase B Maximum              | 2021/06/04 19:35:00 | 1.099  | kVAr |
|                    | Phase C Maximum              | 2021/06/05 17:57:00 | 0.335  | kVAr |
|                    |                              |                     |        |      |
| Apparent Power     | Phase A Maximum              | 2021/06/05 17:27:00 | 9.355  | kVA  |
|                    | Phase B Maximum              | 2021/06/06 06:42:00 | 6.511  | kVA  |
|                    | Phase C Maximum              | 2021/06/05 10:26:00 | 9.520  | kVA  |
|                    | Ph A Apparent Power Average  |                     | 0.932  | kVA  |
|                    | Ph B Apparent Power Average  |                     | 2.067  | kVA  |
|                    | Ph C Apparent Power Average  |                     | 2.239  | kVA  |
|                    |                              |                     |        |      |
| Power Factor       | Ph A Powerfactor Average     |                     | -0.633 |      |
|                    | Ph B Powerfactor Average     |                     | 0.513  |      |
|                    | Ph c Powerfactor Average     |                     | -0.499 |      |
|                    |                              |                     |        |      |
| Maximum Demand kW  | Active Power                 | 2021/06/07 06:40:00 | 11.382 | kW   |
|                    | Apparent Power               |                     | 11.452 | kVA  |
|                    | Reactive Power               |                     | 0.000  | kVAr |
|                    | Power Factor                 |                     | -0.994 |      |
|                    |                              |                     |        |      |
|                    |                              |                     |        |      |
| Maximum Demand kVA | Apparent Power               | 2021/06/05 18:06:00 | 17.288 | kVA  |
|                    | Active Power                 |                     | 0.000  | kW   |
|                    | Reactive Power               |                     | 0.661  | kVAr |
|                    | Power Factor                 |                     | 0.999  |      |
|                    |                              |                     |        |      |
| Energy             | Import Active Energy         |                     | 76.6   | kWh  |
|                    | Import Active Energy Phase A |                     | 10.9   | kWh  |
|                    | Import Active Energy Phase B |                     | 28.6   | kWh  |
|                    | Import Active Energy Phase C |                     | 37.1   | kWh  |

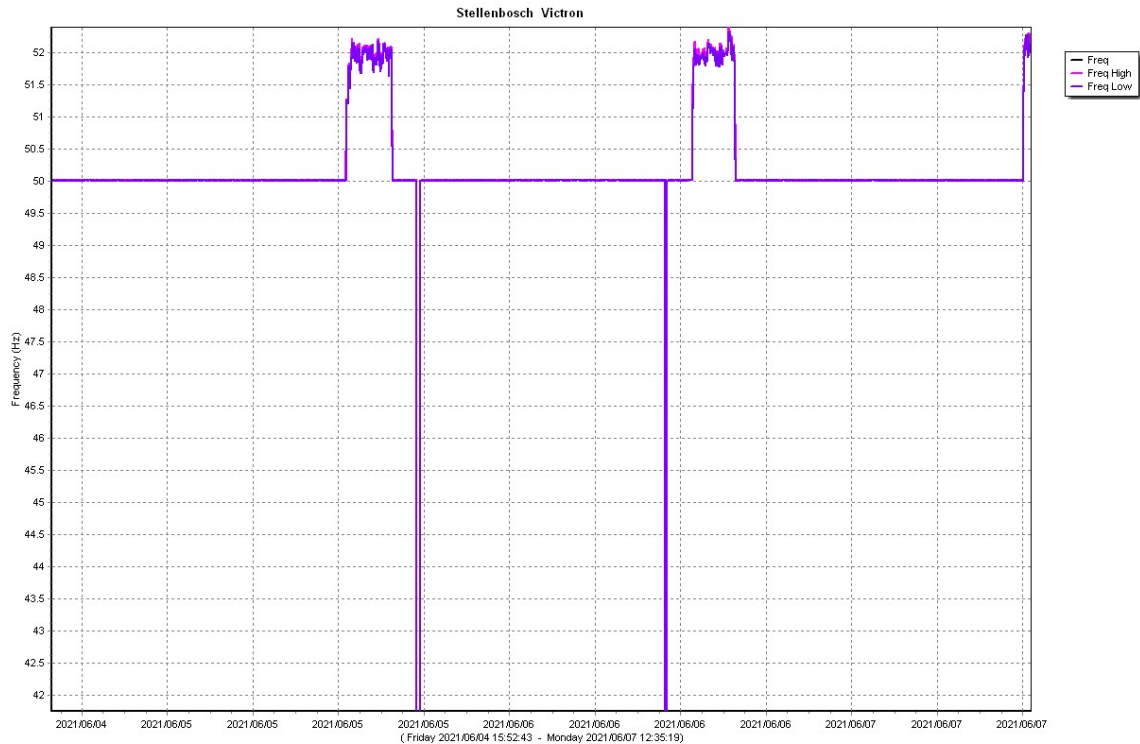
## Zoomed Graphs



Graph of Current for time of Maximum Current demand



Graph of Summed kVA for time of Maximum demand



**Graph showing the frequency for complete recording period**

### **Voltage Dips**

A total of 412 Dips were recorded  
 All these dips are very short in duration.  
 Typically, 60 milliseconds or less.  
 They are also about 10% of nominal.

### **Voltage Swells**

A total of 8 swells were recorded  
 All these swells are also very short in duration.  
 Typically, between 10 and 60 Milliseconds

### **Regulation**

It is clear that there is no difference between the voltage regulation at the BD board and at the termination box close to the inverter. This indicates that the cable between the inverter and the BD board is the correct size and well terminated.

I hope that this information is sufficient for your application.  
 If you need any additional information, please feel free to contact me at any time

Regards

Willem Loubser

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